ALBERTA'S GAS SUPPLY PROTECTION

PROCEDURES AND FORMULAE

DECEMBER 1979

ENERGY RESOURCES CONSERVATION BOARD
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This report, like others produced by the Board, is the result of detailed work by many of the Board's staff. A. R. Fraser and H. G. Halladay carried the major responsibility.

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1 SUMMARY

On the basis of a detailed study of the long-term impact of Alberta's 30-year protection procedures and formulae, the Board recognized that these procedures and formulae provided protection in excess of what was originally intended. Further, the Board believes that changing circumstances may have reduced the degree of protection which is appropriate.

Accordingly, the Board provided an opportunity, in Proceeding No. 790491 - Phase II, for interested persons to present their views on the matter. The Board held a public hearing on the matter in Calgary on 20, 21, and 22 March 1979 with V. Millard and V. E. Bohme, P.Eng., sitting.

Having regard for the evidence in the 18 submissions received and its own review of the matter, the Board has decided to continue with the current surplus test but to reduce the protection period from 30 to 25 years; replace the future and overall tests with a deliverability test which will assess whether the long-term annual requirements can be met; and suspend the application of the availability for contracting test.

2 INTRODUCTION

2.1 BACKGROUND

The Gas Resources Preservation Act (the Act) provides, among other things, that removal of gas from the province may occur only when authorized by a permit issued by the Board with the approval of the Lieutenant Governor in Council. The Act further provides that the Board shall not grant a gas removal permit unless it is in the public interest to do so having regard to:

- the present and future needs of persons within the province, and
- the established reserves and trends in growth and discovery of reserves of gas in the province.

In assessing an application for a gas removal permit, the Board determines whether the proposed removal would be in the public interest using procedures and formulae which have been established over several years. The most recent changes to the Board's approach took place in 1975. At that time, the Board held a public hearing to review the procedures used to determine the reserves of gas surplus to Alberta's requirements and published its findings and decisions on the matter in ERCB Report 76-C[1].

The Board announced that it would hold a public hearing (Proceeding No. 780491) in two phases in 1979 to consider the ultimate potential for gas and co-products in Alberta (Phase I), and the formulae and procedures for determining the amount of gas surplus to Alberta needs (Phase II). The notice of hearing is included in this report as Appendix A. The

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1 Report and Decision on the Review of Procedures for Determining the Reserves of Gas Surplus to the Requirements of Alberta. ERCB Report 76-C, July 1976.

Board's decisions on these matters were summarized in ERCB Report 79-B[2]. The details of Phase I of the proceeding are dealt with in ERCB Report 79-G[3] and the details of Phase II are contained in this report.

A detailed study of the long-term impact of the 30-year protection procedures and formulae, suggested that the current policy provides excess protection. Further, changing circumstances may have reduced the degree of protection which is appropriate. Accordingly, the Board provided an opportunity, in Phase II of the hearing, for interested persons to present their views on the matter.

The notice of hearing asked for submissions respecting the Board's procedures for determining:

- Alberta's present and future requirements of gas over the future protection period, and
- the supply of gas which should be available above existing or new gas removal permit commitments to provide adequately for Alberta's requirements.

2.2 THE HEARING

The hearing was held on 20, 21, and 22 March 1979 in Calgary with V. Millard and V. E. Bohme, P.Eng., sitting.

The Board received 26 interventions in response to its notice of hearing, including a submission by the Board staff and 18 submissions which contained evidence. The Board staff submission outlined the Board's then-current formulae and procedures and described, for illustrative purposes, alternative methods which could be considered. The submission did not make recommendations nor take a position with respect to any of the alternatives.

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2 Summary Report on Alberta Gas Reserve and Removal Matters. ERCB Report 79-B, June 1979.

3 Ultimate Potential For Gas In Alberta. ERCB Report 79-G, December 1979.

Canadian Superior withdrew its submission at the opening of the hearing. Trunk Line, Consumers' Gas, Hudson's Bay, Norcen, Union Gas, and Westcoast intervened for purposes of cross-examination and argument only.

Participants at the hearing are listed in Table 2-1.

2.3 CURRENT METHOD OF GAS SURPLUS DETERMINATION

The Board's procedures, incorporating changes made as a result of the 1975 hearing and review, are described in detail in Appendix B and summarized below.

The present method of protection used by the Board is a two-stage surplus test. The first stage is to determine whether the gas is surplus to the current and future requirements of the province and the second is to determine the availability of gas for contracting by those who purchase gas for Alberta consumption.

In the first stage of the test, the Board divides the province's gas reserves and requirements into current and future categories. Current reserves are taken as the remaining established reserves within economic reach, less reserves from which production is deferred. Current requirements are taken as the greater of 30 times the Alberta requirements for delivery in the first year of the period under consideration ($30A_1$) or the remaining reserves committed to and supplying Alberta's requirements. The current requirements also include the remaining commitments for delivery under the existing removal permits, provision to meet the terminal year peak-day requirements for certain permits, and the shrinkage, fuel, and loss associated with the reprocessing and transportation within Alberta of gas being removed from the province. The current surplus is determined by subtracting the current requirements from the current reserves. This calculation is commonly referred to as the "current surplus test".

The future reserves are taken as a portion of the currently-deferred and beyond-economic-reach reserves, the reserves providing for terminal year peak-day requirements in certain permits, and an allowance for new reserves to be discovered during the next few years. The remaining requirements are total Alberta requirements in excess of $30A_1$, including

an estimate of the reserves required to support delivery of the 30th-year peak-day requirements. The future surplus is determined by subtracting the remaining requirements from the future reserves. This calculation is commonly referred to as the "future surplus test". The "overall surplus" is calculated as the sum of the current and future surpluses.

The second stage of the surplus test determines the amount of gas available for contracting to those who purchase gas for Alberta consumption, and is commonly referred to as the "availability for contracting test". The surplus available for contracting is determined by subtracting the reserves under contract to the permittees and the reserves required by Alberta users (that is, $30A_1$) from the "current reserves" as determined in the current surplus test.

The Board would not authorize any new permit volumes if either the current or overall surplus was in a deficit position, regardless of the results of the availability for contracting test. If the current and overall surpluses were positive and the surplus available for contracting zero or positive, the Board would grant an application for the removal of gas volumes shown to be surplus to the needs of the province. The Board has stated that, if the amount of gas available for contracting were modestly negative, it would have regard for the volumes of gas which would be supplied by the permit holders to Alberta users and might consider that the test indicated that sufficient gas was available to meet Alberta's requirements. If a large deficit existed in the reserves available for contracting, the Board would not approve additional gas removal even if the current and overall surpluses were positive.

2.4 SUMMARY OF PARTICIPANTS' VIEWS

The participants' views respecting matters of particular importance to the Board, are highlighted on Table 2-2. More detailed discussions of their views can be found in sections 4 and 5. As shown on the table, the majority of the participants believed that the current and future surplus tests should be retained but modified, the availability for contracting test discontinued, and a deliverability test added.

TABLE 2-1 THOSE WHO APPEARED AT THE HEARING

Principals and Representatives (Abbreviations used in Report)	Witnesses
The Alberta Gas Ethylene Company Ltd. (AGEC) F. R. Foran	Dr. J. P. Sutherland
The Alberta Gas Trunk Line Company Limited (Trunk Line) F. R. Foran J. Hopwood, Q.C.	
Alberta and Southern Gas Co. Ltd. (Alberta and Southern) J. R. Smith, Q.C.	D. R. Fenton, P.Eng. G. M. Malin, P.Eng. Dr. D. E. Armstrong of Manecon Associates Limited
Amoco Canada Petroleum Company Ltd. (Amoco) H. L. Hooker	I. G. Bryden, P.Eng. B.A. Golke, P.Eng. H. Simons
Canadian-Montana Pipe Line Company (Canadian-Montana) W. H. Coldiron	W. H. Coldiron
Canadian Petroleum Association (CPA) D. B. Macnamara	G. Durham, P.Eng. of Shell Canada Resources Limited Dr. C. Mattinson of Shell Canada Resources Limited
Canadian Superior Oil Ltd. (Canadian Superior) J. P. Peacock	
Canadian Western Natural Gas Company Limited and Northwestern Utilities Limited (Alberta Utilities) J. W. Beames, Q.C. C. K. Sheard	J. H. Pletcher, P.Eng. G. H. Welsh, P.Eng.
City of Calgary R. F. Goss	H. D. Hunter, P.Eng. of H. Douglas Hunter & Associates Ltd.
City of Edmonton Dr. D. L. Flock	Dr. D. L. Flock, P.Eng. of the University of Alberta
Consolidated Natural Gas Limited (Consolidated) R. K. Laing	I. F. Taylor, P.Eng.

TABLE 2-1 cont'd THOSE WHO APPEARED AT THE HEARING

Principals and Representatives (Abbreviations used in Report)	Witnesses
The Consumers' Gas Company (Consumers' Gas) J. H. Farrell	
Dome Petroleum Limited (Dome) J. F. Scott	C. D. Holder, P.Eng. E. Muchowski W. E. Richards
Esso Resources Canada Limited (Esso) R. T. Booth	G. L. Haight, P.Eng. J. W. Pollock, P.Eng.
Gulf Canada Resources Limited (Gulf) A. P. Scott	G. A. Connell, P.Eng. R. V. Lang, P.Eng.
Hudson's Bay Oil and Gas Company Limited (Hudson's Bay) R. M. Perrin	
Independent Petroleum Association of Canada (IPAC) C. K. Yates	G. J. Last, P.Eng. of Sabre Petroleum Ltd. A. E. Potter, P.Eng. Dr. A. H. Younger, P.Eng. of Dome Petroleum Ltd.
Norcen Energy Resources Limited (Norcen) J. J. Marshall	
Northern and Central Gas Corporation Ltd. (Northern and Central) B. K. Singer	R. T. Rhodes, P.Eng.
Pan-Alberta Gas Ltd. (Pan-Alberta) J. Stein	L. H. Larson, P.Geol. A. N. Edington, P.Eng. of Sproule Associates Limited
PanCanadian Petroleum Limited (PanCanadian) D. G. Hart	R. H. Mackie W. C. Reinwart
Shell Canada Resources Limited (Shell) J. M. Killey	H. N. S. Hart D. G. Stoneman, P.Eng.

TABLE 2-1 cont'd THOSE WHO APPEARED AT THE HEARING

Principals and Representatives (Abbreviations used in Report)	Witnesses
TransCanada PipeLines Limited (TransCanada) E. W. H. Mallabone	B. G. Luft G. W. Toews A. A. Wilkins, P.Geol.
Union Gas Limited (Union Gas) D. McFadden	
Westcoast Transmission Company Limited (Westcoast) A. A. Arneson, P.Eng.	
Energy Resources Conservation Board staff (Board staff) J. D. Dilay, P.Eng. A. L. McLarty H. J. Webber, P.Eng.	

TABLE 2-2 SUMMARY OF PARTICIPANTS' VIEWS RESPECTING ALBERTA GAS SUPPLY PROTECTION FORMULAE

Participant	1	2	3	4	5	6	7	8	9	10	11
	Test										
	Current Surplus			Future Surplus			Availability for Contracting			Deliverability	
	Retain As Is	Retain But Modify	Discontinue	Retain As Is	Retain But Modify	Discontinue	Retain As Is	Retain But Modify	Discontinue	Yes	No
CONSUMERS											
AGEC[1]											
Alberta Utilities	•			•			•			•	
City of Calgary	•			•			•			•	
City of Edmonton	•			•			•				
Northern & Central											
PERMITTEES											
Alberta & Southern			•			•			•	•	
Canadian-Montana											
Consolidated		•			•				•		•
Pan-Alberta		•				•			•		•
TransCanada		•				•		•		•	
PRODUCERS											
Amoco[2]		•				•		•			•
CPA		•			•				•	•	
Dome			•			•			•	•	
Esso			•			•			•	•	
Gulf		•			•				•	•	
IPAC			•			•			•	•	
PanCanadian		•			•			•			
Shell		•			•				•	•	

1 AGEC did not present specific views respecting the tests but suggested that the tests should provide for a pattern of gas production which would ensure ethane would be available for ethylene feedstock.

2 Amoco proposed a combined current-future test.

3 DEFINITION OF ISSUES

The Board believes that the issues raised in the notice of hearing and by the participants at the hearing can be divided into major and minor categories.

The major issues are the use of:

- the current surplus test
- the future surplus test
- the availability for contracting test
- a deliverability test

The other issues to be considered are:

- the maximum permit term
- the treatment of ethane
- the need for periodic permit reviews
- the frequency and scope of supply-demand hearings

4 FORMULAE AND PROCEDURES TO BE ADOPTED

4.1 CURRENT SURPLUS TEST

4.1.1 Views of the Participants

Of the 18 submissions to the hearing, 11 stated that the current surplus test should be retained either in its present or a modified form, 4 believed it should be discontinued, and 3 expressed no specific view. With reference to the 11 submissions which recommended that the current surplus test be retained, 3 believed that the test should be left in its present form and 8 stated that it should be modified so as to decrease the amount of protection (that is, change $30A_1$ to about $20A_1$ or $25A_1$).

The Alberta Utilities and the Cities of Calgary and Edmonton believed that the test should be retained in its present form. All 3 believed that the current surplus test was a time-proven method of determining the quantity of gas surplus to Alberta's requirements and could see no reason to alter the test.

Of the 8 submissions which stated that the current surplus test should be retained but modified to decrease the protection ($30A_1$), 4 stated that the protection should be reduced to $25A_1$, 3 suggested a reduction to $20A_1$, and Consolidated recommended varying the protection according to end-use category of requirements. The reasons advanced for reducing the protection from $30A_1$ to either $20A_1$ or $25A_1$ were similar in most submissions. The participants reasoned that these lesser amounts of protection would provide adequate time for all classes of consumers to evaluate their positions and, if necessary, convert to alternative sources of energy. Furthermore, it was stated that the clause in current removal permits, which gives Alberta consumers priority over gas leaving the province, together with the gas purchase contracts that the Alberta Utilities have with the major permit holders, provide additional

protection. Consolidated did not specifically recommend an appropriate degree of protection for each end-use category of requirements but, for illustrative purposes, suggested that the protection for the residential category might be in the order of $40A_1$, commercial $30A_1$, and industrial and thermal electric $20A_1$.

4.1.2 Views of the Board

The Board believes that the current surplus test is a key indicator of whether there are established gas reserves surplus to current requirements. It is a simple and readily understood test and, furthermore, is a test employed by the National Energy Board (NEB). All things considered, the Board believes the test should be retained.

The Board has also considered whether the $30A_1$ protection should be reduced as several of the participants suggested. The Board recognizes that conditions have changed significantly since $30A_1$ was first adopted. At that time, gas requirements were increasing rapidly and there was considerable uncertainty about future requirements. The province's ultimate potential for gas was also almost completely open to question and there was little recognition of the future importance of alternative energy sources. Today, however, there is much greater confidence in estimates of both future gas requirements and reserves. Furthermore, there is general acceptance that, before the end of this century, the production of gas from coal will become economic. Since Alberta has very substantial coal reserves, consumers in the province can be assured of gas supplies over a very long term. Therefore, the Board believes that the amount of protection should have regard for the normal contracting period and should provide sufficient time to adjust for changing conditions. In the Board's view, this suggests protection in the order of $20A_1$ to $25A_1$. Recognizing that the NEB has recently adopted $25A_1$, the Board also has decided to select $25A_1$ as an appropriate protection period.

4.2 FUTURE SURPLUS TEST

4.2.1 Views of the Participants

With reference to the future surplus test, 8 of the 18 submissions stated that they would like to see the test retained either as is or in modified form, 7 believed the test should be discontinued, and 3 did not express an opinion on the matter.

The Alberta Utilities and the Cities of Calgary and Edmonton believed that the test should be retained without modification. They stated that the test was a time-proven method of determining the quantity of gas surplus to Alberta's requirements. Furthermore, they stated that such a test has never prevented the granting of a removal permit nor resulted in the "locking-in" of gas reserves.

CPA believed that the Board should continue to use the future surplus test, but modify it to reduce the period of protection to 25 years, to include additional future reserves and to reduce the amount of protection for the terminal year peak-day requirements. CPA recommended that the Board recognize future reserve additions projected to occur in the ensuing 10-year period because it believed new discoveries are predictable for approximately 10 years. CPA stated that the Board's allowance of about 2.5 years for future reserves is unduly conservative in a stable environment where reasonable incentives prevail. CPA stated that the reserves set aside for terminal year peak-day requirements should be reduced to the average daily requirement plus an additional 10 per cent allowance for peaking. CPA proposed this modification because it believed the load factor would continue to increase and that, during the next 10 to 20 years, gas reservoirs would become available for storage. Consolidated submitted that the future surplus test should be continued but modified so as to include all undiscovered reserves up to the Board's estimate of the ultimate potential for gas. In addition, Consolidated believed that the 30-year requirements in this test should be continued. PanCanadian stated that the future surplus test should be retained but modified to reduce the protection period to 20 years and to use at least 130 trillion cubic feet as the estimate for ultimate potential for gas.

Shell believed that the future surplus test should be retained but modified to reduce the protection period to 25 years and increase the allowance for future reserves to the projected discoveries for the ensuing 15-year period. Gulf submitted that the future surplus test should be continued but modified so as to substitute 25 years for 30, use an increased load factor for estimating the amount of cushion gas necessary to meet the terminal year peak day, and allow for trend gas equivalent to the estimated additions during the next 10 years.

Pan-Alberta believed the future surplus test should be discontinued. It stated that, if this test were eliminated, gas removal permit volumes would be based solely on remaining reserves at the time of the permit approval and, therefore, all subsequent reserve additions would be available to supply Alberta's requirements.

Alberta and Southern, Dome, Esso, IPAC, and TransCanada all believed that the future surplus test should be discontinued and replaced by a deliverability test because they believed a deliverability test would provide a more realistic assessment of the province's gas surplus.

4.2.2 Views of the Board

The original intent of the future surplus test was to provide an overview of how the future growth in Alberta's requirements could be met from future reserves. In retrospect, the Board recognizes that the test was not completely successful and is probably the least understood component in the current policy. The method of allowing for future reserve growth is very conservative and, consequently, yields misleading results. Furthermore, the test does not fully recognize the pattern of reserve growth or the total gas supply potentially available in the province.

The Board believes that the objective of the future surplus test can be achieved more successfully by a broad assessment of demand and supply. It therefore has decided to discontinue the future surplus test and replace it with a broad deliverability test which is discussed in section 4.4.

4.3 AVAILABILITY FOR CONTRACTING TEST

4.3.1 Views of the Participants

Alberta and Southern, CPA, Consolidated, Dome, Esso, Gulf, IPAC, Pan-Alberta, and Shell stated that the availability for contracting test should no longer be applied as a test in assessing an application to remove gas from the province. They believed that the test was no longer required because the Alberta Utilities have supply contracts with the major permit holders, the permits contain a clause which gives Alberta consumers priority over any gas to be removed from the province, and the circumstances which led to the test no longer exist. Amoco stated that, while the test should not be rigidly applied, it should be retained as a check to be applied only if the Alberta Utilities were experiencing difficulty in contracting sufficient gas supplies.

Those in favour of retaining the availability for contracting test included the Alberta Utilities, the Cities of Calgary and Edmonton, PanCanadian, and TransCanada. The Alberta Utilities stated that the circumstances which led to the implementation of the test are not present at this time. However, they added that such circumstances could reappear in the future. They stated that, so long as they were neither contracting for gas nor having difficulty contracting for gas, the test should not be rigidly applied or perhaps should be disregarded. However, Alberta Utilities stated that the test should be applied if they were experiencing problems in contracting gas regardless of whether the other tests were positive. TransCanada held a similar view with respect to the test.

PanCanadian stated that the availability for contracting test should be retained primarily as a monitoring tool. It believed that the test indicates whether there is an acceptable balance between the volume of gas under contract to the permittees and the volume they have authorized for removal. PanCanadian added that, if such information were available on an individual permittee basis, producers seeking contracts would know which gas purchasers had excess volumes under contract.

4.3.2 Views of the Board

Having regard for the evidence presented at the hearing and its own review of the matter, the Board believes that the availability for contracting test should be suspended as a specific test in assessing applications to remove gas from the province. The circumstances which led to the implementation of the test in 1976 are not present today nor do they appear likely to occur in the foreseeable future. Notwithstanding, the Board will continue to evaluate annually the reserves of gas under contract to permittees. The Board remains of the view that reserves equal to permit volumes plus permit-related requirements should be under the permittee's control.

4.4 DELIVERABILITY TEST

4.4.1 Views of the Participants

Amoco, Consolidated, and Pan-Alberta were opposed to using a deliverability test because they believed that such a test is unnecessary and would be both inaccurate and administratively burdensome.

Four of the ten participants who recommended that the Board adopt a deliverability test believed that such a test should completely replace reserve tests, while the remaining eight believed that a deliverability test should be used in conjunction with either the existing reserve tests or some modified reserve test. Those who favoured a deliverability test generally believed that such a test would more realistically depict the surplus situation, allow flexibility, and assist in long-term resource planning. They believed these advantages would outweigh the administrative complexity of such a test.

4.4.2 Views of the Board

In order to determine whether gas proposed for removal from the province is actually surplus to Alberta's long-term requirements and the remaining permit commitments, the Board believes that it is necessary to

consider the future annual balance between total requirements and available supply. Indeed, this was the basic objective of the future surplus test. The Board agrees with those participants who contended that an annual gas deliverability forecast provides the best means of comparing future requirements and available supply.

The Board appreciates the concerns of those participants who questioned the accuracy or dependability of deliverability forecasts. The Board believes that, while projections may be made in minute detail or on a broad generalized basis, the latter approach would be adequate and compatible with the basic purpose of the test, particularly under circumstances where gas supplies are abundant. This approach should, in the Board's view, avoid many of the problems identified by those participants opposed to a deliverability test.

The projection of deliverability or supply should reflect the best estimate of the annual potential productive capacity of both established and future reserves and would be compared to forecast Alberta requirements, remaining permit commitments and the applied-for permit volumes. The forecast period should be at least as long as the term of the requested permit but the Board for its own analysis probably would make its projections for a 25-year period. Since the test will be applied on a broad basis, the comparison of demand and supply will relate annual requirements and deliverability rather than peak-day values. However, some allowance for peak-day requirements will be provided because the estimate of the annual deliverability of each pool will reflect the capability of the pool to produce on a sustained basis, restrictions due to gas plants and other facilities, and the provisions of gas purchase contracts. For these reasons, the annual deliverability will be less than the maximum day deliverability and will thereby provide for at least a portion of peak-day requirements.

Appendix C provides further details as to the manner in which the Board envisages the deliverability test being made. The Board recognizes the potential difficulties in making the comparison but believes these can be minimized by discussions between its staff and interested persons to review the basis for the estimates and in particular the example provided in Appendix C. Within the next few months the Board will invite

interested persons to attend such a meeting.

With respect to the interpretation of the demand and supply projection, the Board expects that if a significant supply deficit appeared likely it would decide to authorize lesser volumes than applied for or place conditions in the permit limiting removals in certain years such that the deficiency would be avoided. However, the Board believes that it should retain sufficient flexibility in interpreting the deliverability test so that it could judge each application on its own merits and authorize such volumes as it considers to be appropriate under the circumstances.

Finally, the Board believes that a regular forecast of annual gas demand and supply will not only assist it in evaluating applications to remove gas from the province but would probably be of interest and assistance to the government, public, and industry.

5 OTHER MATTERS

5.1 MAXIMUM PERMIT TERM

5.1.1 Views of the Participants

A number of the participants addressed the issue of maximum permit term. CPA stated that the Board should consider approval of new removal permits for periods of up to 20 years. CPA added that, when considering the term of a removal permit there are two countervailing tendencies. First, it is desirable to have relatively short permit terms in order to improve the protection for Alberta in the event that the requirements and supply forecasts are erroneous. Second, permits with terms as long as possible could improve the marketability of gas.

Dome stated that the Board should not adopt any arbitrary term for gas removal permits. It believed that the Board should have regard for many factors such as whether new facilities are required to transport the gas, the maturity of the gas industry, the number of outstanding removal permits, and the termination dates of existing permits.

IPAC submitted that the term of a removal permit should be set after the hearing of specific applications so that the supply assurance required by the customers can be taken into account. IPAC stated that, while it would not suggest a maximum permit term, it believed that the Board, in establishing the term of a permit, must balance the needs of the extra-provincial consumers with the degree of protection to be afforded Alberta.

TransCanada submitted that the Board should be prepared to issue permits for a term of up to 25 years. It also submitted that the term should not be limited to any particular number of years if such limitation would prevent removal of contracted reserves which are surplus to the Alberta requirements. Northern and Central supported TransCanada's proposal, but would find 20 years acceptable. Northern and Central added that the

longer term is preferable because it would facilitate and aid in the maintenance of competitive pricing.

5.1.2 Views of the Board

For several years, gas removal permit terms have been limited to about 12 to 15 years unless the applicant could show that special circumstances exist to warrant a longer term. Prior to that time, the Board had issued permits with significantly longer terms, frequently for 25 years. The Board recognizes that gas supply conditions have changed significantly during the last few years and sees less need to be concerned about the permit term. It believes that, while 12 to 15 years is a reasonable guideline, the best procedure would be to assess each application on its own merit rather than to adopt any specific maximum term.

5.2 TREATMENT OF ETHANE

5.2.1 Views of the Participants

Dome submitted that an applicant for removal of ethane from Alberta should only be required to demonstrate that an ethane surplus exists and should not be required to demonstrate that a gas surplus exists.

While AGEC did not propose any specific gas or ethane supply protection formulae, it stated that any formulae adopted by the Board should not result in sharp declines in gas production. AGEC stated that such declines would be detrimental to Alberta's ethane-based petrochemical industry because sufficient lead time would not be provided for conversion to alternative feedstocks.

5.2.2 Views of the Board

While the procedures to be applied in the consideration of applications to remove ethane from the province were not under review at this proceeding, the Board recognizes the close relationship which ethane surplus tests have with those adopted for gas.

In the past, applicants for ethane removal have been required to show, through application of the gas surplus tests, that the requested ethane volumes are surplus to Alberta's gas requirements. In addition, they have been required to show, through application of a year-by-year ethane availability test, that the applied-for volumes are surplus to Alberta's ethane requirements. In making a forecast of ethane availability, reference must be made to a gas supply forecast since ethane is a by-product of gas. In turn, the gas supply forecast must take into account the Board's gas supply protection formulae if the forecast is to be realistic. The Board, therefore, believes that any ethane protection formulae would have to be compatible with the subsisting gas protection formulae. The new gas deliverability test adopted by the Board would appear to avoid some of the difficulties under the previous system, however, the Board would be prepared to consider modifications to the ethane protection formulae either at a separate hearing or, as seems more appropriate, at the time of the next application for the removal of ethane.

5.3 PERIODIC PERMIT REVIEWS

Several of the interveners, notably TransCanada, suggested that periodic permit reviews may be necessary. TransCanada contended that under-utilization of permits could preclude other applicants from obtaining new or additional removal authorizations.

The Board agrees that the removal volumes specified in permits should represent what the permittees will likely remove and it intends to more closely monitor the removals under each permit. Where it appears that the applicant will be unable to remove the authorized volumes, the Board will request information from the permittee as to the reason for the shortfall and the permittee's estimate of future removals. Where the shortfall appears to be long-term, the Board would expect the permittee to apply for an amendment to its permit. In the absence of such an application, the Board, on its own motion, would convene a hearing to consider whether the permit should be amended.

In view of the foregoing, the Board does not believe that regular periodic reviews of all permits are warranted.

5.4 FREQUENCY AND SCOPE OF SUPPLY-DEMAND HEARINGS

A number of participants recommended that the Board hold major hearings approximately every three years to consider the supply of and requirements for all types of energy within Alberta. They also recommended that the hearing be co-ordinated with the timing of similar NEB hearings.

The Board continues to believe that there is merit in reviewing the overall demand for all types of energy resources in Alberta on a regular basis, such as every three years. Accordingly, the Board will continue to hold formal hearings to review Alberta's energy requirements. Also, the Board believes that it would be beneficial if such reviews preceded those held by the NEB.

With reference to supply, the Board believes that it may be appropriate to receive evidence during the requirements proceedings, but only in a broad or generalized manner. The Board considers a detailed review of energy supply in a hearing-type proceeding to be unwarranted at this time. Instead, it prefers a flexible timetable and format to consider reserves and deliverability for each energy resource. In the case of gas, the Board intends to initiate proceedings each year involving industry submissions on pools of interest followed by Board staff reviews (which may involve meetings with submittors) and Board decisions on the pools studied. The Board intends to review major pools every two or three years, and all minor pools over a five to seven-year period. The industry submissions would be expected to deal with reserves, deliverability, expected additions of wells and facilities, and gas contract provisions. The Board expects to issue a comprehensive informational letter on this matter early in 1980.

6 FINDINGS AND DECISION

Having studied the evidence submitted, and having regard to the advice of its staff, and to its own knowledge and responsibilities under The Gas Resources Preservation Act, the Board has decided to:

- continue with the current surplus test but to reduce the protection from $30A_1$ to $25A_1$;
- replace the future and overall tests with a deliverability test which will assess whether the long-term annual requirements can be met;
- suspend the application of the availability for contracting test;
- grant permit terms based on its assessment of the merits of each application;
- monitor permit removals and review permits if it appears necessary but not to hold regular periodic reviews of all permits; and
- continue to conduct formal proceedings, approximately every three years, to review Alberta's total energy requirements and to conduct reviews of gas reserves and deliverability in a broad generalized manner.

Details of each of these matters are given in sections 4 and 5.

V. Millard
Chairman

V. E. Bohme, P.Eng.
Board Member

Dated at Calgary, Alberta, this 17th day of December 1979.

7 IMPLEMENTATION

The Board believes that the new protection formulae outlined in this report should be applied in all future assessments of gas removal applications. While the Board has not as yet developed a computer model which will yield satisfactory deliverability forecasts, it expects to have a working model in the near future. In the interim, the Board believes that any applications which come before it can be assessed on the basis of deliverability studies which have been performed by the Board in the recent past.

The requirements of the Board for information in support of future applications for removal of gas from the province are outlined in the Board's Informational Letter No. IL 79-25 which is included as Appendix D to this report.

APPENDIX A NOTICE OF HEARING

ENERGY RESOURCES CONSERVATION BOARD

THE OIL AND GAS CONSERVATION ACT

THE GAS RESOURCES PRESERVATION ACT

PROCEEDING NO. 780491

NOTICE OF HEARING

ULTIMATE RESERVES OF GAS AND CO-PRODUCTS
ALBERTA GAS SUPPLY PROTECTION FORMULAE

WHEREAS the Energy Resources Conservation Board will conduct a two-phase public hearing respecting (a) Phase I - the ultimate reserves of gas and co-products in Alberta, and (b) Phase II - the formulae for determining the amount of gas surplus to Alberta needs.

THEREFORE TAKE NOTICE that the Energy Resources Conservation Board will hold a public hearing at the Court House, 611 - 4 Street S. W., Calgary, Alberta, on Tuesday, 13 February 1979, at the hour of 9:00 a.m., for the purpose of hearing representations respecting Phase I described above. While the Board does not wish to restrict the content of submissions, for convenience in interpretation the Board asks that:

1. all estimates be on an initial basis - i.e. before production;
2. estimates be clearly identified as in-place raw gas and recoverable marketable gas;
3. where convenient, estimates of both in-place raw gas and recoverable marketable gas be classified as to
   (a) gas expected to be economically recoverable under current technology and anticipated costs and prices,

divided as to

   (i) appreciation of reserves considered proved as of 31 December 1977, and reported on in ERCB Report 78-18; and
   (ii) new discoveries;

(b) gas expected to be economically recoverable only under significantly improved technology divided as to

(i) appreciation of reserves considered proved as of 31 December 1977, and reported on in ERCB Report 78-18, and

(ii) new discoveries;

4. to the extent practical, estimates be supported by discussions of geological setting, results of recent exploration, trends in exploration and production technology, trends in costs and prices, and expected reservoir conditions (such as size, entrapment, rock quality and depth).

Although the above guidelines relate to Alberta's ultimate reserves of gas in the entire Province, the Board would welcome any submission which addressed itself only to specific areas or parts of the Province.

The Board would also appreciate receiving submission respecting the initial ultimate recoverable reserves of co-produced ethane, propane, butanes, pentanes plus, and sulphur classified as in item 3 above.

Any person making submission with respect to Phase I of the hearing shall file on or before 15 December 1978, twenty copies of his submission with the Board at 603 - 6 Avenue S. W., Calgary, Alberta, T2P 0T4. A copy of each submission may be inspected at the Board's Records Centre after 20 December 1978, or may be obtained from the submitter by interested persons upon request.

Any person intending to make a submission in response to a submission filed in accordance with the last preceding paragraph shall file, on or before 1 February 1979, twenty copies of his submission with the Board and two copies of the submission with the person to whose submission he is responding at the address set out in that person's submission.

FURTHER TAKE NOTICE that the Energy Resources Conservation Board will hold a public hearing at the Court House, 611 - 4 Street S. W., Calgary, Alberta, on Tuesday, 13 March 1979, at the hour of 9:00 a.m., for the purpose of hearing representations respecting Phase II described above.

The hearing will not deal with the basic policy of protection for the present and future needs for gas of persons within the Province as provided for in The Gas Resources Preservation Act, but will consider

modifications to the formulae and procedures currently used by the Board in the administration of the Act.

Representations will be heard on the Board's procedures for determining:

1. Alberta's present and future requirements of gas over the future protection period, and

2. The supply of gas which should be available above existing or new gas removal permit commitments to provide adequately for the requirements described in item 1.

The Board staff will file a submission by 30 October 1978, outlining the current formulae and procedures and commenting on certain of the factors involved, and outlining some possible alternative administrative practices.

Any person making submission with respect to Phase II of the hearing shall file on or before 3 January 1979, twenty copies of his submission with the Board at 603 - 6 Avenue S. W., Calgary, Alberta, T2P 0T4. A copy of each submission may be inspected at the Board's Records Centre after 8 January 1979, or may be obtained from the submitter by interested persons upon request.

Any person intending to make a submission in response to a submission filed in accordance with the last preceding paragraph shall file, on or before 20 February 1979, twenty copies of his submission with the Board and two copies of the submission with the person to whose submission he is responding at the address set out in that person's submission.

DATED at Calgary, Alberta on 29 August 1978.

ENERGY RESOURCES CONSERVATION BOARD

A. L. McLarty
Board Solicitor

APPENDIX B EXISTING PROTECTION FORMULAE

For convenience, this appendix is a reproduction of section 2 of the Board staff submission to the hearing.

The present method of protection used by the Board is a series of tests which compare the appropriate proved and future gas reserves to the requirements over a 30-year period on a total province-wide basis. The results of the tests are dependent on a number of key estimates, particularly respecting the remaining recoverable gas reserves, the anticipated growth rate of gas reserves, the ultimate potential for gas and the future Alberta requirements for gas. Ethane is considered as gas for purposes of these tests. In addition, when being proposed for removal by itself, ethane is considered separately using a year-by-year availability test. The year-by-year test for ethane is not under review at the subject hearing and consequently will not be commented on further. The following is a summary of the manner in which the Board presently determines the reserves of gas that are surplus to the province's requirements.

In considering an application to remove gas from the province, the Board applies a two-stage surplus test. The first stage is to determine whether the gas is surplus to the current and future requirements of the province and the second is to determine the availability of gas for contracting by those who purchase gas for Alberta consumption.

B.1 CURRENT AND FUTURE SURPLUS TEST

In this surplus calculation, the Board divides the province's gas reserves and requirements into current and future categories. Table B-1 shows these categories with each entry identified by a number on the left side of the table which conforms with the numbering in the following description of the items.

CURRENT RESERVES

1. *Now considered within economic reach* - Total proved gas reserves from pools which are either on production or considered capable of sustaining economic production assuming available markets.

2. *Deferred* - Includes all gas reserves from which initial production is deferred for conservation reasons beyond three years unless the reserves are under firm contract to a company removing gas from the province and are included in a permit or an application for a permit to remove gas. Deferred reserves consist largely of gas-cap and gas reserved (with or without specific identification) for use in existing and future enhanced oil recovery projects. They do not include cycled gas pool reserves where a substantial portion of the produced gas is marketed. In determining the portion of an otherwise deferred reserve which will be classified as current, the Board adheres to the following rules:

- Where a reserve is not under contract but has qualified as current because initial production will take place within three years, the current reserves will be the total production resulting if the approved producing rate is projected to the end of the 30-year protection period.
- Where a reserve has been classified as current because the reserve is under contract and is also included in a permit or an application for permit, the current portion will be those reserves deliverable during the term of the permit. The deliverable reserves will be determined as the total production if the existing producing rate is projected until the time when full or normal deliveries can be expected and the normal delivery rate is projected thereafter until the terminal year of the permit.
- Where a reserve is under contract, in whole or part, to an Alberta consumer, the portion of the reserve considered as current will be determined on the basis of a detailed study of the particular situation.

3. *Total Current Reserves* - Item 1 minus item 2.

CURRENT REQUIREMENTS

Current Alberta Requirements

4. *General requirements* - The greater of 30 times the requirements for delivery in the first year of the period under consideration ($30A_1$) or the remaining reserves committed to and supplying Alberta's requirements.

5. *Permit-related fuel and shrinkage* - The shrinkage, fuel and loss requirements associated with the transportation within Alberta of gas being removed from the province and the removal within Alberta of natural gas liquids from this gas at reprocessing (straddle) plants.

6. *Permit Requirements: To meet remaining commitments* - The remaining permit commitments for delivery.

7. *Permit Requirements: To meet terminal year peak day* - A requirement for certain earlier permits where calculations published by the Board have included some quantity of gas to provide for the terminal year peak day and where the permittee has not subsequently agreed to discontinuing the provisions. The volume is determined from detailed deliverability estimates for the permits to which it still applies.

8. *Total Current Requirements* - The sum of items 4, 5, 6, and 7.

9. *CURRENT SURPLUS* - Item 3, total current reserves, minus item 8, total current requirements.

REMAINING REQUIREMENTS

10. *Total Alberta requirements for delivery* - The 30-year gas requirements of the province determined by the Board following total energy requirements hearings held periodically. The findings of the most recent Board hearing is published in ERCB Report 78-I[1]. Between hearings, the 30-year gas requirements are estimated having regard to relevant considerations including the formula described in detail in Appendix C of ERCB Report 76-C or on the basis of revised 30-year estimates.

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1 Energy Requirements in Alberta. ERCB Report 78-I, September 1978.

In determining the 30-year requirements for surplus calculation purposes, the gas utilized as fuel in field and gas processing plant operations, and portions of the raw gas removed as by-products or contaminants in field processing plants are not included as part of Alberta's requirements. This is because such gas is considered as part of the pool surface loss and the reserves as estimated by the Board are adjusted to reflect these uses. On the other hand, the surface loss adjustment to pool reserves does not reflect the permit-related requirements referred to above and for this reason, the Board estimates these requirements separately (item 5).

11. *Deliveries from current reserves* - Is that portion of the reserves assigned to meet general requirements (item 4) projected to be actually delivered during the 30-year period. These deliveries reflect the steadily increasing size of the market being served and also the delivery capabilities of the reserves. They are determined on the basis of detailed deliverability studies.

12. *Permit-related fuel and shrinkage* - Same as item 5. The permit-related fuel and shrinkage that will be delivered during the 30-year period.

13. *Deliveries required from other sources* - Item 10 minus items 11 and 12.

14. *Total Alberta requirements for 30th-year peak day* - The "cushion gas" or gas reserves remaining in the ground required to meet Alberta's peak-day requirements in the terminal year of the protection period. These are determined using detailed deliverability studies or calculated by formula using factors determined from the previously mentioned detailed deliverability estimates. Between hearings the cushion gas requirement is adjusted having regard for a number of considerations including the formula described in Appendix C of ERCB Report 76-C.

15. *Available from current reserves* - The portion of current reserves not deliverable during the 30-year period. It is calculated as the difference between the general requirements, item 4, and the deliveries from current reserves, item 11.

16. *Required from other sources to meet 30th-year peak day* - Item 14 minus item 15.

17. *Total Remaining Requirements* - Item 13 plus item 16.

REMAINING AND FUTURE RESERVES

18. *From deferred gas available within 30 years* - The portion of deferred gas not included as current reserves but estimated by the Board on the basis of the best information available to be deliverable during the 30-year period or available to support the 30th-year peak-day requirements.

19. *From reserves now considered beyond economic reach* - The gas estimated to be deliverable within 30 years or available to support the 30th-year peak-day requirement from reserves now considered beyond economic reach. Under current conditions it is taken as 75 per cent of the total reserves now considered beyond economic reach.

20. *From reserves providing for terminal years peak day in permits* - Same as Item 7.

21. *From gas not yet proved* - The future reserves available from gas not yet proved is determined by projecting a growth rate, based on the growth experienced over the most recent 10-year period, into the future a number of years calculated by the following formula:

$$T_G = \frac{R_{POT} - R_{EST}}{10\ (0.028)}$$

where T_G = years of growth of gas reserves (rounded to nearest half year);

R_{POT} = ultimate (formerly potential) initial marketable gas reserves of the province, trillions of cubic metres

R_{EST} = proved (formerly established) initial marketable reserves at the date of the surplus calculation, trillions of cubic metres

10 = arbitrary constant determined as a result of representations at a previous gas removal policy hearing ($0.028\ m^3$ is approximately equal to $1\ ft^3$ of gas at base conditions)

By example, current circumstances yield,

$$T_G = \frac{(3.099 - 2.359)}{10\ (0.028)}$$

$$= 2.5 \text{ years (rounded)}$$

22. *Total Remaining and Future Reserves* - Sum of items 18, 19, 20, and 21.
23. *FUTURE SURPLUS* - Item 22 minus item 17.
24. *OVERALL SURPLUS* - Item 9 plus item 23.

B.2 AVAILABILITY FOR CONTRACTING TEST

The purpose of this test is to determine if reserves are available for contracting to supply Alberta's gas requirements. Table B-2 shows the categories considered. As in Table B-1 each entry is identified by a number on the left side of the table and explained below.

1. *Total Current Reserves* - Same as item 3 in Table B-1.
2. *Reserves Under Contract to Permit Holders* - The volume of reserves actually under contract to permit holders. The reserves are based on contract data obtained periodically from permittees and the Board's estimate of reserves. They include all reserves under contract to the permittees with the exception of those deferred.
3. *Reserves Available to Alberta Users* - Item 1 minus item 2.
4. *Reserves Required for Contracting by Alberta Users* - 30 times Alberta's first year's general requirements unless Alberta utilities or consumers have appeared before the Board and satisfied it that it would be prudent to place some greater (or lesser) volume under contract to meet Alberta's requirements.
5. *Surplus of Reserves Available for Contracting* - Item 3 minus item 4.

B.3 INTERPRETATION OF THE SURPLUS TESTS

The Board would not authorize any new permit volumes if a deficit existed in either the current or overall surplus calculations (Table B-1) regardless of the results of the availability test. If the results of the current and overall surplus calculations were positive and the availability for contracting test zero or positive, the Board would be receptive to granting the removal of gas up to that shown in Table B-1 to be surplus to the needs of the province. If the amount of reserves available for contracting (item 5 on Table B-2) were modestly negative, the Board would have regard for the volumes of gas which would be supplied by the permit holders to Alberta users and could consider that the test indicated that sufficient gas was available to meet Alberta's requirements. If a significant deficit existed in the contracting test, no permit volumes would be authorized even if the initial surplus test calculation showed that the gas was surplus.

B.4 AVAILABLE RESERVES

In considering an application, the Board uses the following approach to determine the reserves available to Alberta consumers, a permittee, or an applicant for a permit:

1. An applicant for a permit must have 100 per cent of the total volume applied for as well as the permit-related fuel and shrinkage requirements under contract or otherwise deemed available to it. In addition, some portion of the gas in each field, pool, or area to be included in the permit must be under contract. Gas under contract outside fields, pools, or areas named in the permit may only be used to meet the permittee's permit-related requirements.
2. Only the gas actually under contract to a purchaser in a field, pool, or area will be considered by the Board to be available to that purchaser. However, uncontracted fringe reserve areas may be grouped with nearby contracted areas if it is judged unlikely that wells will be completed in the fringe areas and that the reserves in the fringe areas will be produced by the wells in the contracted areas.

These rules apply to all pools with the exception of those pools or portions of pools considered deferred. Deferred reserves are not generally considered for inclusion in a permit. Deferred reserves cannot be used to meet the permit commitments, however, a portion of the deferred reserves under contract can be used for the purpose of meeting part or all of the permittee's permit-related requirements in Alberta beyond the period of deferment. For any particular application, the portion is determined having regard for the nature of the deferred reserves involved and the likely timing of production relative to the applicant's delivery requirements.

B.5 TERM AND OTHER PERMIT CONDITIONS

The Board now limits gas removal permit terms to about 12 to 15 years, unless the applicant can show that special circumstances exist to make a longer term necessary.

As an overriding provision, most gas removal permits contain a clause which requires that the permittee must supply gas at a reasonable price to any community or consumer within the province that is willing to take delivery of it at a point on the pipeline system, if, in the Board's opinion, it can be reasonably supplied by the permittee.

TABLE B-1 ESTIMATE BY THE BOARD OF THE GAS SURPLUS TO ALBERTA'S REQUIREMENTS AND PERMIT COMMITMENTS AS OF 31 DECEMBER 1977
(All volumes 10^9 m^3 on basis of 37.4 megajoules per m^3)
ILLUSTRATIVE ONLY

	CURRENT RESERVES				
1.	Now considered within economic reach		1 555		
2.	Less: Deferred		113		
3.	Total Current Reserves			1 442	
	CURRENT REQUIREMENTS				
	Current Alberta Requirements				
4.	General requirements	383			
5.	Permit-related fuel and shrinkage	45			
6.	Permit Requirements: To meet remaining commitments	665			
7.	To meet terminal year peak day	3			
8.	Total Current Requirements			1 096	
9.	CURRENT SURPLUS				346
	REMAINING REQUIREMENTS				
10.	Total Alberta requirements for delivery	600			
11.	Less: Deliveries from current reserves	273			
12.	Less: Permit-related fuel and shrinkage	45			
13.	Deliveries required from other sources		282		
14.	Total Alberta requirements for 30th-year peak day	192			
15.	Less: Available from current reserves	110			
16.	Required from other sources to meet 30th-year peak day		82		
17.	Total Remaining Requirements			364	
	REMAINING AND FUTURE RESERVES				
18.	From deferred gas available within 30 years	113			
19.	From reserves now considered beyond economic reach	42			
20.	From reserves providing for terminal years peak days in permits	3			
21.	From gas not yet proved	234			
22.	Total Remaining and Future Reserves			392	
23.	FUTURE SURPLUS				28
24.	OVERALL SURPLUS				374

TABLE B-2 ESTIMATE OF THE RESERVES OF GAS AVAILABLE FOR CONTRACTING AS OF 31 DECEMBER 1977
(All volumes 10^9 m^3 on basis of 37.4 megajoules per m^3)
ILLUSTRATIVE ONLY

1.	Total Current Reserves[a]	1442
2.	Reserves Under Contract to Permit Holders	972
3.	Reserves Available to Alberta Users	470
4.	Reserves Required for Contracting by Alberta Users ($30A_1$) (does not include permit-related requirements)[a]	383
5.	Surplus of Reserves Available for Contracting	87

a From Table B-1.

APPENDIX C NEW METHOD OF GAS SURPLUS DETERMINATION

This appendix shows an example surplus calculation for a hypothetical application to remove 50 x 10^9 m^3 of gas from Alberta over the 15-year period from 1 January 1981 to 31 December 1995. The example assumes that the applicant has the volumes under contract and that they are deliverable during the term of the permit.

C.1 RESERVES TEST

The calculation of the reserves surplus for the example is shown in Table C-1. Each entry is identified by a number on the left side of the table which conforms with the numbering in the following description of the items.

1. *Total Remaining Established Reserves:* Consistent with the definitions in the Board's annual report entitled, "Alberta's Reserves of Crude Oil, Gas, Natural Gas Liquids, and Sulphur". The estimate should reflect an assessment date, for purposes of the surplus calculation, which is consistent with the assessment date chosen in estimating the applied-for reserves.
2. *Beyond Economic Reach:* The Board has recently revised its rules for classifying reserves as "beyond economic reach". In future, the Board's annual reserves report will show the reserves beyond economic reach. An applicant's rules for classifying reserves as "beyond economic reach" should be stated if they differ from those used by the Board.
3. *Deferred:* Includes all gas reserves from which initial production is deferred for conservation reasons beyond three years unless the reserves are under firm contract to a company removing gas from the province and are included in a permit or an application for a permit to remove gas. Deferred reserves consist largely of gas-cap gas and gas reserved (with or without specific identification) for use in existing and future enhanced oil recovery projects. They do not include cycled gas pool reserves where a substantial portion of the

produced gas is marketed. In determining the portion of an otherwise deferred reserve which will be classified as current, the Board will continue to adhere to the rules as set out in Appendix B, section B.1.

4. *Total Available Reserves:* Item 1 minus items 2 and 3.

5. *General Requirements (25A$_1$):* Taken as 25 times Alberta's requirements for delivery in the first year of the period under consideration. Reprocessing fuel and shrinkage for gas supplying Alberta requirements (currently, only at the Dome-CUE Edmonton reprocessing plant) are considered as part of the general requirements. Further, since ethane used as ethylene feedstock is included as either permit-related shrinkage or as the Dome-CUE plant shrinkage, it is not included in Alberta general requirements.

6. *Permit-related Fuel and Shrinkage:* The fuel and loss associated with the transportation within Alberta of gas being removed from the province and the shrinkage and fuel associated with reprocessing of such gas within Alberta.

7. *Remaining Permit Commitments:* Total of all volumes authorized for removal from the province. This item does not include ethane removal permits because ethane for both Alberta use and removal from Alberta is considered as reprocessing shrinkage in items 5 and 6.

8. *Applied-for and Deliverable Volumes:* The lesser of the volume applied-for or the volume under the control of and deliverable by the permittee during the term of the permit.

9. *Total Requirements:* The sum of items 5, 6, 7, and 8.

10. *Reserves Surplus:* Item 4 minus item 9.

In the previous surplus test, the Board had protected for a volume to meet terminal year peak-day requirements in certain permits. In order to be consistent with the Board's recent policy of requiring that 100 per cent of the authorized volumes be under contract to the permittee and that such volumes can reasonably be expected to be delivered during the term of the permit, the Board believes that the permittee should be responsible for contracting for volumes to provide its peak-day requirements. Accordingly, the Board has deleted this requirement from the surplus test.

C.2 DELIVERABILITY TEST

The example deliverability test is shown in Figure C-1.

The demand portion of the deliverability test consists of a forecast of the Alberta general requirements plus gas required to meet existing permit commitments, the applied-for permit volumes, and the permit-related fuel and shrinkage. Alberta general requirements are determined by the Board at periodic hearings held to determine total energy requirements. These requirements include transportation fuel and reprocessing fuel and shrinkage for gas supplying Alberta requirements but do not include permit-related transportation fuel, permit-related reprocessing fuel and shrinkage, nor ethane used as petrochemical feedstock. The Alberta requirements shown in Figure C-1 were based on ERCB Report 78-I. The demand to be attributed to the permits, both existing and applied-for, is the expected production under those permits having regard for the volumes deliverable by and the markets available to each permittee and applicant. Any deliverability not utilized in the early years is 'rolled forward' on an appropriate basis. The expected permit production shown in Figure C-1 is based on a preliminary analysis by the Board.

The supply portion of the deliverability test consists of a calculation of Alberta's potential productive capacity assuming no market restrictions but having regard for purchase contracts as well as infill drilling, compression, and facility construction which can reasonably be expected under favourable market conditions. The total potential productive capacity will include the gas expected to be available from both established reserves and expected discoveries.

The Board is currently developing a gas deliverability computer model for use in calculating Alberta's potential productive capacity and the expected production under existing and applied-for permits. However, for purposes of the example shown in Figure C-1, the potential productive capacity is based on ERCB Report 78-E[1] adjusted to reflect an ultimate potential of 3.8×10^{12} m^3.

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1 The Supply of and Demand for Alberta Gas. ERCB Report 78-E, May 1978.

While the deliverability test described above does not make specific allowance for peak-day requirements, some consideration of these requirements is built into the calculation because the estimate of the annual deliverability for each pool will reflect the capability of the pool to produce on a sustained basis, gas plant or other facility restrictions, and the approximate load factor of the markets being served. For these reasons it will be somewhat lower than the maximum day deliverability. As the Board gains experience with a deliverability model, it will be able to make a detailed assessment of the province's ability to meet future peak-day requirements. If such an assessment indicates that serious shortfalls may occur in meeting peak-day requirements, the Board will consider making the assessment of such requirements a formal part of the surplus test.

C.3 INTERPRETATION OF THE SURPLUS TESTS

The Board would not authorize any new permit volumes which would result in a deficit in the reserves test regardless of the results of the deliverability test. If a deficit occurred in the deliverability test, the Board might authorize lesser volumes in a new permit or place conditions in the permit limiting removals in certain years such that the deficit would be avoided. However, the Board believes that it should retain sufficient flexibility in interpreting the deliverability test so that it could judge each application on its own merits and authorize such volumes as it considers to be appropriate under the circumstances. The deliverability test, therefore, would be utilized to obtain a broad assessment of the surplus situation rather than as a rigid test.

TABLE C-1 GAS RESERVES TEST (ILLUSTRATIVE ONLY)
10^9 m^3 at 37.4 x 10^6 joules per m^3

	RESERVES	
1.	Total Remaining Established Reserves	1 760
2.	Less: Beyond Economic Reach	56
3.	Less: Deferred	104
4.	Total Available Reserves	1 600
	REQUIREMENTS	
	Alberta Requirements	
5.	General Requirements ($25A_1$)	360
6.	Permit-related fuel and shrinkage	95
	Permit Requirements	
7.	Remaining Permit Commitments	898
8.	Applied-for and Deliverable Volumes	50
9.	Total Requirements	1 403
10.	RESERVES SURPLUS	197

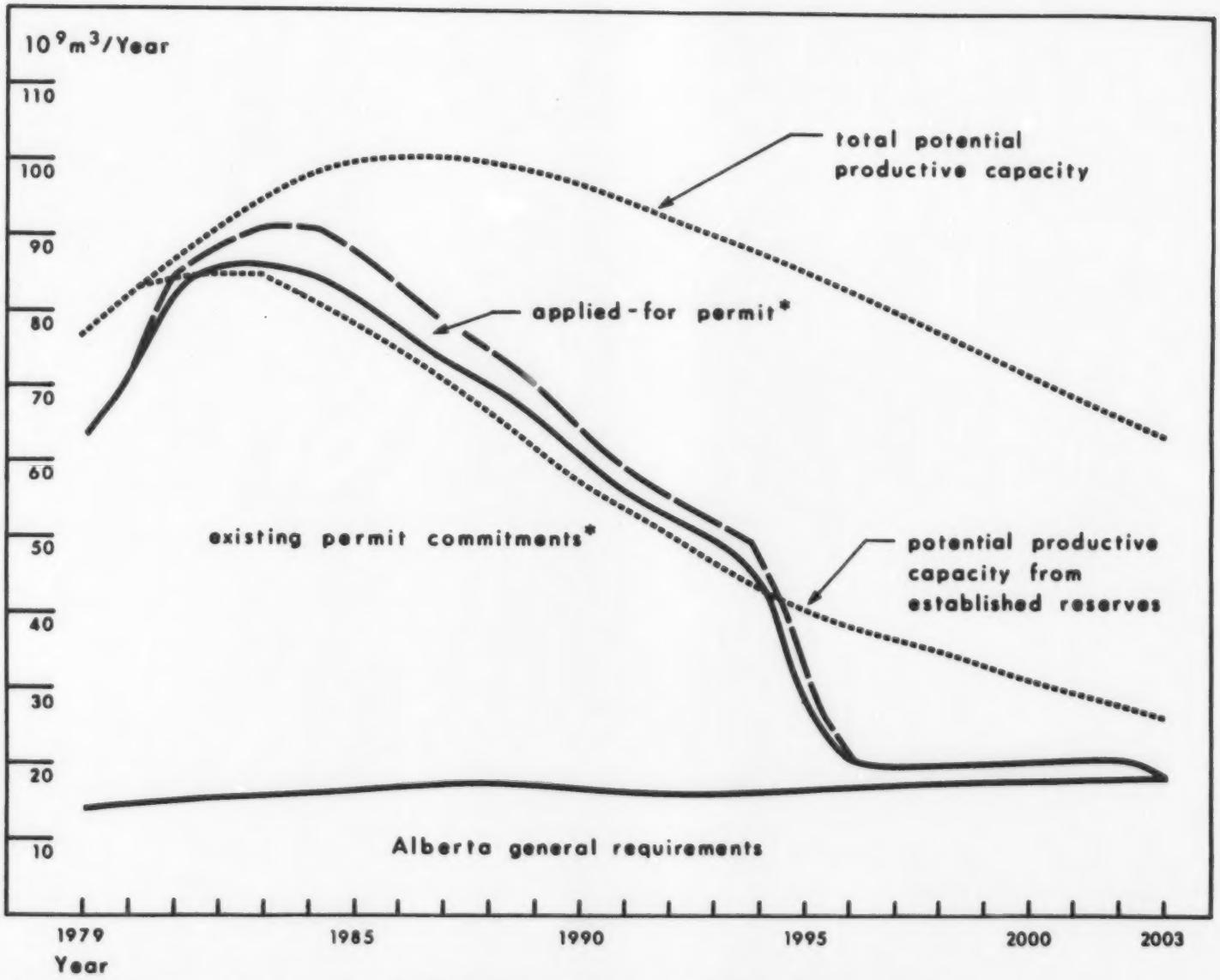

FIGURE C-1 GAS DELIVERABILITY TEST (ILLUSTRATIVE ONLY)

* Includes permit-related fuel and shrinkage

APPENDIX D INFORMATION REQUIRED IN SUPPORT OF AN APPLICATION FOR GAS REMOVAL

Energy Resources Conservation Board
Calgary, Alberta

Informational Letter
IL 79-25

TO: ALL OPERATORS, MAJOR GAS PURCHASERS, GAS TRANSMISSION COMPANIES, PRINCIPAL CITIES, AND CERTAIN OTHERS

APPLICATIONS UNDER THE GAS RESOURCES PRESERVATION ACT FOR THE REMOVAL OF GAS FROM ALBERTA

This informational letter supersedes Informational Letter IL 70-22 dated 10 April 1970.

The attached document outlines the requirements of this Board for information in support of applications to remove gas from Alberta. Since propane is currently excluded from the application of The Gas Resources Preservation Act (the Act) by Alberta Regulation 447/78, the Board has not considered it in this letter.

Where the volume of gas applied for is such that the application would qualify under section 12(a) of the Act as one which may be granted without a hearing, the Board would expect that many of the items listed in the attachments would be dealt with by reference to the most recently published and relevant report of the Board.

If you have further questions respecting this matter, please contact the Board's Gas Department at 261-8311.

ISSUED at the City of Calgary, in the Province of Alberta, this 17th day of December 1979.

V. Millard
Chairman

Attachment

ATTACHMENT TO IL 79-25

REQUIREMENTS OF THE BOARD FOR INFORMATION IN SUPPORT OF AN APPLICATION FOR REMOVAL OF GAS FROM ALBERTA

In addition to conforming with the requirements of section 7 of the Board's "Rules of Practice" (Alberta Regulation 149/71 made pursuant to The Energy Resources Conservation Act), an application for gas removal must contain the information as set out in the following items:

1. The permit or amended permit term which is being applied for.

2. The total volume of gas proposed to be removed from the province under the permit, normally being the sum of the expected deliveries outside Alberta as determined in item 10. In the case of an application for amendment of the total permit volume, the volumes available under the existing permit must also be accounted for.

3. The proposed maximum daily and annual rates of gas removal during the proposed permit term.

4. A list of the pools, fields, and areas (including location and geological description) which the applicant is applying to have named in the permit as sources from which the gas may be obtained for removal from the province.

5. Evidence that 100 per cent of the total gas proposed to be removed plus permit-related requirements (see item 7) are under the control of the applicant. The evidence should include a tabular summary of the reserves under contract, maps identifying the lands for which gas is under the applicant's control (including geological zone restrictions, if applicable), and, for contracted reserves, a form or general description of each of the types of gas purchase contracts by which reserves are committed to the proposed scheme. The filing of forms of contracts and detailed land maps will not be necessary where the type of contract and the land under contract is unchanged from that submitted to the Board in a previous application.

6. Estimates of reserves of gas in each pool, field, or area from which gas is proposed to be removed. For any other pool with remaining marketable reserves larger than four billion cubic metres (m^3), reserve

estimates should be submitted if the applicant's reserve estimate differs by more than some 10 to 15 per cent from the most recently published Board estimate. Board designated field and pool names as well as strike area names should be used or cross referenced, where available.

The reserve estimate for each pool, unless it is a published Board estimate or is identical to a detailed estimate previously placed before the Board, must include the geological, engineering, and other data used in the estimate. Unless exempted by the Board, such data shall be in SI units and shall include:

- a map or maps showing the wells which penetrated the pool; the gas pay or pore volume thickness at each well; the isopachs or structural contours used to estimate the reserve; the positions of the fluid interfaces; if applicable, the portion of the isopachs deemed to have a "probable" or "possible" degree of reliability; the location of the "type well" selected to identify the pool; and the current outline(s) of the relevant Board-designated fields,
- in the title block of each map, a record of the parameter mapped (eg. gross or net pay thickness, reservoir or gas pore volume),
- for each well at which the mapped zone was tested after the setting of production casing, the depths of the perforations and the test data that conclusively proves or disproves the productivity of the well,
- for non-producing small or marginal pools, evidence that production is economically feasible,
- for each pool or individual reserve determination, a completed "summary sheet" (the Board encourages the use of the attached summary sheet, copies of which are available upon request at the Board offices in Calgary), and, for solution-gas pools, the reserve estimate should include, in addition to the information on the summary sheet, the stock tank oil in place and the gas-oil ratio used in the calculation, and
- where a reserve estimate is based on a pressure decline study, the manner of calculating and the data supporting each of the pressure points.

7. A schedule showing, for the requested term of permit, the potential productive capacity for each individual pool, field, or area from which gas is proposed to be removed and a summation of these schedules showing the total potential productive capacity of all reserves considered in the project.

Each schedule should reflect the deliverability characteristics of the wells in the pool, including anticipated deliverability characteristics of all untested and infill wells, pipeline operating pressures, contract rates of take, and such infill drilling, addition of compression, construction of gas processing and other facilities, and on-stream dates for shut-in and unconnected reserves as can reasonably be expected under favourable market conditions.

While the Board will accept general statements discussing the data and assumptions used in deriving the potential productive capacity schedules for small pools, such data and assumptions should be shown in detail for pools with remaining marketable gas reserves in excess of 300×10^6 m^3.

8. A schedule showing, for the requested term of permit, the Alberta requirements which are directly connected to and dependant upon the volumes of gas to be removed from the province. These permit-related requirements would include transportation fuel and losses, and might include fuel and shrinkage for a reprocessing plant should the volume of gas applied for be subject to reprocessing. The gas necessary to provide for these fuel and shrinkage requirements may come from fields or areas not named in a permit or applied for or may come from permit or applied-for permit fields. Where the necessary volumes are not available from non-permit fields, they must be provided for from permit fields in addition to the reserves in such fields intended for removal from the province.

9. A schedule showing, for the requested term of permit, the gas required to meet the applicant's ex-Alberta markets. The schedule should be supported with a general description of the nature of the market to be served.

10. A schedule showing, for the requested term of permit, the expected removals from the province. The schedule should reflect the total potential productive capacity from item 7, the Alberta requirements from item 8, any anticipated supply of gas to Alberta consumers, and the applicant's ex-Alberta markets from item 9.

11. Evidence that the proposed removal of gas is in the public interest, having regard to:

(a) the present and future needs of persons within the province (the Board will consider the requirements of the province at public hearings to be held periodically. Specific reference must be made to such requirements, but the data supporting the detail of the estimated requirements will be considered at the requirements hearings and need not be included in applications to remove gas from the province).

(b) the established reserves and trends in growth and discovery of reserves of gas in the province.

The evidence should include a surplus evaluation using the procedures set out by the Board in Appendix C of ERCB Report 79-I[1]. In the case of applications for small volumes of gas, reference to the most recent Board publication may suffice with respect to evidence regarding the public interest.

12. Evidence respecting arrangements to supply gas to utility companies, communities or consumers within the province. Such information need not be included if it has previously been submitted to the Board.

13. Evidence that the necessary facilities for the gathering and transporting of the gas within the province will be available and the timing of their availability. This may be in the form of a letter from The Alberta Gas Trunk Line Company Limited offering or agreeing to have the necessary facilities available.

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1 Alberta's Gas Supply Protection Procedures and Formulae. ERCB Report 79-I, December 1979.

14. In the case of a new scheme, a brief description of the route, line size, location and size of compressor stations and total capital cost of new or additional pipeline facilities for transportation within and beyond the province of the gas proposed to be removed.

15. In the case of a new scheme, general evidence respecting its feasibility.

ENERGY RESOURCES CONSERVATION BOARD

RESERVE SUBMISSION SUMMARY SHEET

D-7

FIELD AND POOL _____

SUBMITTED BY _____ DATE _____

TYPE OF RESERVE _____
(ASSOCIATED OR NON-ASSOCIATED)

MEAN FORMATION DEPTH K.B. _____ S.S. _____

TYPE WELL (LOCATION)
_____ W _____ M.
TOP OF PAY K.B. _____ S.S. _____
BASE OF PAY K.B. _____ S.S. _____

AVERAGE POROSITY (FRACTION) _____
SOURCE _____
CUTOFFS: POROSITY _____ SOURCE _____
_____
PERMEABILITY _____ SOURCE _____
_____

GAS SATURATION (FRACTION) _____
Sw _____ SOURCE _____
_____
So _____ SOURCE _____
_____

INITIAL RESERVOIR PRESSURE (kPa) _____
SOURCE _____
_____

RESERVOIR TEMPERATURE _____ °C _____ K
SOURCE _____
_____

COMPRESSIBILITY FACTOR Z
(Pr _____ Tr _____)
SOURCE _____

GAS ANALYSIS Pc _____ kPa Tc _____ K
RELATIVE DENSITY _____
SOURCE _____

GROSS HEATING VALUE (MJ/m^3) _____
SOURCE _____
_____

RESERVE ESTIMATE - INITIAL CONDITIONS

	PROVEN	PROBABLE
G/W, metres SS		
G/O, metres SS		
O/W, metres SS		
AREA, hectares		
h, metres		
VOLUME, $10^4 m^3$		
ϕ		
GAS SAT., fraction		
P_i, kPa		
T, K		
Z		
m^3/m^3		
GIP, $10^6 m^3$		
RESERVOIR LOSS		
PRODUCIBLE, $10^6 m^3$		
SURFACE LOSS		
MARKETABLE		

MARKETABLE GAS PRODUCED	
REMAINING ESTABLISHED MARKETABLE	
EFFECTIVE DATE	

POOL RECOVERY FACTOR _____ % SOURCE _____
_____
_____

SURFACE LOSS FACTOR _____ % SOURCE _____
_____

H_2S _____ % CO_2 _____ % C_3+ _____ % PLANT AND LEASE FUEL _____ %

ADDITIONAL COMMENTS _____
_____
_____
_____

EG - 31 - 79 - 12